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Monitoring and Evaluation Report
Lower Gunnison Unit
Colorado River Salinity Control Project
2003

USDA-NRCS

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M&E EXECUTIVE SUMMARY
HYDROSALINITY

Project: Lower Gunnison

- The project plan is to treat **135,000** acres with improved irrigation systems.
- To date, **38,037** acres have improved irrigation systems applied.
- The project plan is to reduce salt loading to the Colorado River system by **166,000** tons of salt.
- In FY 2003, salt loading has been reduced by **3,389** tons/year.
- The cumulative salt load reduction is **65,919** tons/year.

Cost effectiveness –

- The *planned* cost per ton of salt saved with prior year contracts is **$73.15**/ton. The cost per ton of salt saved increased $2.44 per ton due to the additional cost share funding for limited resource producers and beginning farmers available through EQIP. The cost per ton of salt saved would have been **$70.71**/ton without the increased cost share funding for these producers. $/Ton is based on the following formula:

FA + TA = Total Cost X Amortization Factor = Total amortized cost
Total amortized cost divided by total annual tons salt saved = Cost/Ton

FA is total dollars obligated in EQIP & Parallel Program (salinity reduction resource concerns only).
TA is 67% of the FA (This number includes education and monitoring).
Amortization factor for 2003 is .07730.

M&E EXECUTIVE SUMMARY
ECONOMIC AND SOCIAL

CONTRACT INACTIVITY

- During the past fiscal year, were there any contracts found in non-compliance, or were there any cancelled contracts that had remaining items to complete?

Yes **No** (circle one)

- If yes, indicate the level of significance or insignificance.

OTHER PROGRAM BENEFITS

- Considering changes in crop production costs and returns as a result of the salinity practices, has there been a:

Positive effect No effect Negative effect (circle one)

Explain:
Improved water controls allows for improved crop production with less labor input and lower fertilizer loss.

- Is there information collected that indicates effect of program on economic and environmental benefits to the community?

Yes No (circle one)

Explain:
Planned environmental impacts are recorded on each contract on CPA-52 worksheet. Environmental benefits are thus recorded. No economic information is collected; however, cost shared dollars are usually a direct input into the local economy.

M&E EXECUTIVE SUMMARY FOR 'OTHER RELATED ITEMS'

- IRRIGATION INDUCED EROSION – Does the project award ranking points for control of irrigation induced industrial erosion?

Yes No (circle one)

- IRRIGATION WATER MANAGEMENT PROGRAM – Is there an effective funded education program?

Yes No (circle one)

Briefly Explain:

Funding goes to CSUCE, allowing for implementation of an educational program as identified by cooperative agreement. Items include IWM education (one on one) with irrigators, IWM worksheet development for all irrigators, IWM management and education through news articles and public meetings, and accomplishment information using annual reports.

M&E EXECUTIVE SUMMARY – WILDLIFE - 2003

Lower Gunnison Unit

HEP/HSI involving accomplishments made by CRBSCP, I-EQIP, EQIP, Parallel Program, WHIP and WRP. ***(23% of the positive change in 2003 is the result of crediting in one year -2003, all of the WHIP and WRP contracts applied in the salinity area since 1996.)***

Species	Cumulative HUV's 2002	Cumulative HUV's 2003	Net Change for 2003
Pheasant	-1,196	-945	+251
Mallard Winter	+631	+767	+136
Mallard Breeding	-229	-158	+71
Yellow Warbler	-105	-108	-3
Meadow Vole	-320	-287	+33
Marsh Wren	-97	-100	-3
Screech Owl	-1,028	-757	+271
TOTAL	-2,344	-1356	+988

Acres of Wildlife Habitat Applied

	Cumulative Acres 2002	Cumulative Acres 2003	Net Change for 2003
Upland	353.3	422.3	+69
Wetland	135.2	206	+70.8

Wetland Data

Cumulative acres impacted year 2002	Cumulative acres impacted year 2003	NET AREM Unit change 2002	Net AREM Unit change 2002	Net change for 2003
No Data	No Data	No Data	No Data	No Data

Funding for Wildlife Habitat

% of total funds spent on wildlife through 2002	% of total funds spent on wildlife through 2003
1.5%	1.3%
% of total funds contracted on wildlife through 2002	**% of total funds contracted for wildlife through 2003**
7.0%	3.3%

Twelve Wildlife Incentives Program (WHIP) contracts and 1 Wetland Reserve program (WRP) contract have contributed $80,700 to wildlife benefiting practices in the unit, improving 185 acres of upland and 33 acres of wetland habitat.

Hydrosalinity Monitoring and Evaluation

In the year 2003, USDA-NRCS funded the monitoring of irrigations for USDA-NRCS Colorado River Salinity Control under the EQIP program with funds derived from the Lower Basin States. Equipment was set out at 3 sites in the Montrose County study area and 1 site in the Delta County study area in Western Colorado. Applied irrigation water to these fields was measured so that deep percolation losses of the water could be determined.

A meeting was held to ascertain the direction that the program should take with respect to satisfying the objectives of the hydrosalinity monitoring and education. It was decided to monitor 2 sites in the Grand Valley area (Mesa County), 4 sites in the Lower Gunnison area (Montrose and Delta Counties), and 2 sites in the Cortez (Montezuma County) area.

The 2003 irrigation season was characterized by hot, dry windy weather particularly in the mid summer season, much like the 2001 season and the beginning of the 2002 season. This led to the high evapotranspiration rates throughout the entire season. Record high temperatures were recorded regularly in the month of July.

Telephone calls were received from cooperators regarding irrigation questions. Responses were either resolved by one-on-one contacts with the irrigators or by appropriate referrals to other agencies.

The EQIP assisted irrigators appear to be using their structures and irrigation equipment efficiently, and the data suggests that this program is effective in assisting producers to reduce deep percolation losses of irrigation water and hence, salt loading of the Colorado River.

Cooperator producers are extremely pleased with the EQIP program in general.

Several educational programs were undertaken to either present data from the monitoring program or to inform irrigators of proper irrigation methods and procedures.

LOWER GUNNISON IRRIGATION MONITORING
2003
USDA-NRCS

Introduction

The Natural Resources Conservation Service (NRCS) has been placing improved irrigation methodology with selected cost-sharing cooperators since 1979 through the Colorado River Salinity Control Program. Irrigations of several cooperators were monitored with flow measuring equipment to evaluate the effectiveness of the equipment to reduce deep percolation of irrigation water. However, due to reductions in force as a result of budget restrictions, the monitoring efforts by the NRCS were forestalled.

Several entities led by the Salinity Forum requested that the monitoring of selected irrigations in the Lower Gunnison, Montezuma County and Grand Valley Salinity Control units be resumed. Therefore, with monies derived from the Environmental Quality Incentive Program (EQIP) and Lower Basin monies from the three salinity control units, we conducted the monitoring of irrigations in the three units.

The original monitoring plan required that separate irrigation sites be monitored throughout the irrigation season to assess the effectiveness of the improved irrigation systems and irrigation management in reducing deep percolation of irrigation water which contributes salt to the Colorado River system via a loading process.

Methods

A list of possible cooperator irrigators from the Montrose County unit was supplied by the NRCS so that fields could be evaluated for monitoring suitability. A suitable cooperator was located in Delta County. Three cooperators were found in Montrose County and 1 in Delta County and letters were drafted to the 4 selected cooperators to stipulate the terms of monitoring. This is the first year in several that a suitable site was located in Delta County. All sites had isolated inflow and outflow water sources; that is, they were not influenced by any other water sources from adjacent fields. The selected cooperators agreed to contact the local NRCS office several days prior to the irrigation event so that proper measuring equipment could be installed.

Soil samples were taken shortly before any irrigations so that the antecedent soil moisture could be determined. This established the soil moisture deficit that had to be satisfied to fill the soil profile by an irrigation. Subsequent soil moisture deficits were determined by calculating the evapotranspiration (ET) of the crops in the fields and subtracting the crop water use data from the pre-existing soil moisture. Any excess water applied over and above the crop water needs was considered to be lost to deep percolation. No consideration was given to leaching requirements to keep soil salinity at desirable levels.

Irrigation in the Montrose and Delta Counties area is characterized by mostly gravity-fed systems installed on heavy, clayey soils derived from a marine shale formation (Mancos shale) that is very saline. The intake rates of the soils are generally low to medium. By virtue of plentiful and inexpensive irrigation water coupled with the heavy clay soils, long irrigation set times and excessive flow rates are the norm. This leads to deep percolation losses of water and low efficiencies of application. The excess deep percolation water contacts the underlying Mancos shale and subsequently loads salt to the Colorado River. Therefore, the USDA-NRCS Field Offices in both counties have designed and overseen installations of improved irrigation structures and procedures under the auspices of the Colorado River Salinity Control Program. This program has been underway for about 25 years.

Site 1 was planted to new alfalfa in Mesa Clay Loam. Water off of the field (tailwater) was measured by installing a 12" broadcrested flume in the end of the tailwater ditch. Inflow was supplied by siphon tubes placed in a concrete ditch. The inflow water amount was measured by timing the discharge of water from several siphon tubes into a pre-measured bucket and multiplying this value by the number of siphon tubes in a set.

Site 2 is the selenium phytoremediation project planted on Mesa Clay Loam in Montrose County. Since the Lower Gunnison area is presumed to contribute about 30% of the total selenium to the Colorado River system, mostly by irrigation return flow from the surrounding terrain, an experiment is underway to determine if selenium scavenging can be accomplished by several different species of plants in an agricultural setting. There are 2 fields, each about 8 acres in size, at this site. The first field was planted to kenaf, canola and fescue in hopes that one or more of these crops would show promise in scavenging selenium for future disposal. The second was planted to poplar trees; these trees are noted for their ability to scavenge unwanted material from soils. We monitored only the poplar trees in the 2003 irrigation season since some difficulty was experienced with records of inflow to the various crops on the other field during the 2002 season and it appeared that the same situation might arise in 2003.

In order to measure the water on to the poplar field, Site 2 was provided with a propeller flow meter that fits onto the delivery pipes. The runoff (tailwater) was measured with a 12" broadcrested flume placed in the tailwater ditch. The propeller meter was read before and after each irrigation. The fields are part of an active EQIP program.

Site 2 is served by buried pipeline to gated pipe installed under the auspices of the EQIP program.

Site 3 was planted to sweet corn on 16.8 acres of Mesa Clay Loam. The inflow was measured by placing a 18" broadcrested flume at an appropriate place in an open ditch. The outflow was measured by placing a 12" broadcrested flume in the tail water ditch. Both were instrumented with water height recorders. The inflow was delivered to the field via siphon tubes from a concrete ditch following a structure placed in the open earthen ditch.

Site 4 was planted to feed corn and was part of an experiment designed to evaluate the effect of non-linear polyacrylamide (PAM) on water needs for the corn. Non-linear PAM is a highly branched organic polymer that holds water many times its own weight. Presumably, this water would be held from any leaching losses and be available for the plants' use, thus making the application of the water much more efficient. One-half of the field was treated with PAM and 1/2 was left as conventionally planted and irrigated. The PAM side was instrumented with gypsum blocks to ascertain the moisture content of the field and to guide the investigators with respect to irrigation timing. The conventional side was left to be irrigated as the grower decided to do so. The PAM side was irrigated for 24 hours at a set, and the conventional irrigated side was irrigated for 30 hours at a set.

Water on to the field was delivered by buried pipe to gated pipe. We instrumented the runoff from the experimental section of the field with an 18" broadcrested flume and suitable recorder. Inflow was to be provided by one of the investigators.

Stage height sensors and recorders purchased from Omnidata Corp. were installed on the flumes and held in place by bolting them to the frame of the flumes. The equipment senses the pressure exerted by the water in the flume, converts the pressure to height in feet and records the height internally for later retrieval. A portable computer was employed to retrieve the data from the field flumes. The data was then analyzed by a computer program developed in-house to convert the water height to flow.

The fields were visited at least weekly and the data was retrieved for later analysis at that time.

This office continues to receive inquiries from irrigators, many of them new to the area and thus to irrigation, concerning the proper method of irrigation to be used. We worked with a few of these irrigators to assist them in the art of proper irrigation, which resulted in greatly decreased deep percolation losses of their irrigation water. Without this assistance, it is possible that these irrigators could conceivably negate the positive effects of the EQIP irrigations on an acre to acre comparison.

In addition, we participated in several educational aspects of irrigation in a sponsored workshop conducted by Colorado State University. Also, we presented a workshop on salinity to CSU's Master Gardener program. We participated in the local Childrens' Water Festival which was extremely well attended.

Results

Equipment was set out in the field to monitor irrigations on 4 different sites in the Lower Gunnison monitoring area. The first site (site 1) was located in Delta County and is 18 acres in size planted to new alfalfa. The second site (site 2) is northwest of Montrose and is comprised of 2-8 acre fields. The second field was comprised of poplar trees and was measured for inflow and outflow. Site 3 was near Montrose and is a field of sweet corn planted on 16.8 acres. Site 4 is located near Olathe in Montrose County and was planted to feed corn with non-linear PAM placed on 1 side and conventionally treated corn was planted on the adjacent side.

Site 1 in Delta County exhibited little deep percolation throughout the entire season. The producer who irrigates this field is extremely conscientious and follows a very strict irrigation schedule. Therefore, his irrigations produced little deep percolation and relatively high irrigation efficiencies. The quality of the alfalfa hay that he produced appeared to be high. The EQIP cost-shared concrete ditch has served the producer well in improving his irrigation efficiency.

Site 2 was an 8 acre field of poplar trees in a selenium phytoremediation experiment. The trees were irrigated only 2 times during the season; we are not sure why the few irrigations. Therefore, the irrigations indicated that there were no deep percolation losses of water; the irrigations were actually in deficit of filling the soil profile. It is quite possible that the trees are able to derive water from a relatively high water table that exists in the area. As a result, the irrigation monitoring process is of little use to the EQIP program and should be abandoned with that objective in mind.

Site 3 is planted to sweet corn. Sweet corn producers are noted for inadvertently over-irrigating and over-fertilizing to ensure an adequate crop. Sweet corn and tree fruits are the few bright spots in an otherwise dismal commodity market for Western Slope producers, although the sweet corn market was not as strong as in previous years.

In fact, this field was the only one of all of those monitored this year that showed some significant deep percolation. A significant portion of the deep percolation losses occurred at the beginning of the season. Generally, the soil moisture deficit increased quite rapidly through the season due to the warm weather. The application amounts and deep percolation amounts of irrigation water are presented in terms of acre-feet per acre at the end of the report.

Site 4 was part of an experiment designed to study the effects of branched PAM (hydrogel) on water retention in a field of feed corn. PAM was applied to 1/2 of the field and the other half was conventionally irrigated and tilled. The entire field was pre-irrigated and then planted. Reliance upon the gypsum blocks to time irrigation water applications resulted in the PAM side of the field to be under stress. As a result, the conventional side of the field yielded significantly higher amounts of corn than did the PAM side.

We were unable to arrive at deep percolation losses of water because of failure of record keeping regarding the inflow amounts. Runoff amounts of water indicated that the rate of inflow was quite high. However, due to miscommunication, we inadvertently skipped monitoring the pre-irrigation and the first conventional irrigation.

There was no effect of the PAM (hydrogel) on yield; in fact, the conventional side of the field had statically higher yields than did the PAM side. This is due, possibly, to the moisture stress imposed on the PAM side of the field. The irrigation times were 24 hours on the PAM side and 30 hours on the conventional side. Additional studies are warranted since the assumption of the positive effect of PAM (hydrogel) on soil water holding capacity is a valid one.

It was not uncommon to see daily reference evapotranspiration (ET) rates in excess of 0.4" throughout the irrigation season. This depleted the soil moisture rather rapidly, and this allowed room for applied irrigation water to fill the soil profile with less deep percolation than would otherwise be expected.

We have considered deep percolation to be the primary indicator of the effectiveness of the irrigation application; others may be concerned with the efficiencies of the irrigation.

Since the deep percolation losses of water are the main contributor of salt loading to the river system, that figure holds our greatest interest. There was some deep percolation loss of applied irrigation water from the sweet corn field, but none from the selenium phytoremediation site. We were unable to determine deep percolation losses from the PAM study. The alfalfa field in Delta County was irrigated very efficiently and exhibited little deep percolation loss of applied irrigation water.

Previous studies have shown that surface water runoff (tail water) does not change appreciably with respect to salinity in the water as it travels from the head of the field to the bottom of the field.

Since the daily reference ET rates regularly exceeded 0.4" during the irrigation season, the soil moisture was depleted rather rapidly between irrigations. The rate of soil moisture depletion was more rapid than in previous years.

In addition to monitoring irrigations of the aforementioned EQIP cooperators, we responded to 21 telephone calls from irrigators in the 2 counties. Generally, we were either able to assist these people in improving their irrigation procedures or to steer them to the proper NRCS personnel in the Montrose or Delta Field Offices. Several problems were solved by field visits.

The alfalfa producer and the sweet corn producer both wish to remain anonymous in this report.

Educational Activities

One of the more successful activities was a presentation on salinity to the Tri-River Master Gardener class. This event was attended by 122 people from Montrose, Delta and Mesa Counties. In addition, many school children in the local 5th grades attended a Childrens' Water Festival. Our presentation was well received.

Urban Use of Irrigation Water

Although not a part of the EQIP program and the monitoring requirements of the position, we have been concerned about the abuse of irrigation water by suburban and urban users, both newcomers to the area as well as experienced homeowners and small acreage owners. Since the Delta and Montrose areas are being urbanized in as rapid a manner as is the Grand Valley area, concerns must be raised about the abuse of untreated irrigation water by homeowners and small acreage producers.

If one does not change the amount of water delivered to an acreage after conversion to urban-suburban use, the amount of land available for irrigation is decreased. However, in a conventional agricultural setting, the applied water may be lost in several ways; by deep percolation and by tailwater runoff. In a suburban setting, however, the water is usually delivered by sprinklers. The runoff factor becomes minimal. Then, if the homeowner applies water to the remaining land at rates greatly above the evapotranspiration rate, the deep percolation losses become maximized and salt loading to the river may be increased over what was observed when the land was in agricultural production.

Conclusions

1. Deep percolation losses of applied irrigation water were observed in a sweet corn field, but were minimal due in part to several factors:

    a. The improved system is effective in enabling the producer to apply irrigation water efficiently

    b. The irrigator used his water judiciously

2. Deep percolation losses in a poplar selenium phytoremediation site were negative; the irrigations did not fill the soil profile.

3. The antecedent soil moisture and management considerations appear to be the major factors in governing deep percolation of irrigation water.

Recommendations for Future Monitoring

1. Monitoring of irrigation events has proceeded successfully over several years. Further monitoring would only be redundant. Efforts should proceed toward irrigation water management with selected producers.

2. A comprehensive, scientific program of urban water use study and education should be initiated by trained personnel.

3. Monitoring of the phytoremediation project should be completely abandoned. A flume has been left in place and the in-line propeller recorder was left should personnel in the study be interested in continuing monitoring themselves.

Additional

Much of the information reported herein will be presented at several workshops to interested producers.

WILDLIFE

2003 MONITORING & EVALUATION REPORT
LOWER GUNNISON EQIP PRIORITY AREA

HISTORY:

Salinity control work by NRCS has gone through 3 different phases. The first was under the Colorado River Salinity Control program from 1984-1995. Phase 2 was called interim-EQIP and lasted for only fiscal year 1996. The third phase from 1997 to present is funded as a priority area under the EQIP Program. All 3 phases are covered by the same NEPA process and documents that report **replacement of wildlife values foregone (mitigation) and impacts to wildlife will be accounted using a value system**. NRCS chose to use the Habitat Evaluation Procedure (HEP) developed by the U.S. Fish and Wildlife Service for tracking "on farm" changes in wildlife habitat values. Six species models were chosen to represent different aspects of wildlife habitat in the unit that may be impacted by the project. Pheasant was chosen to represent habitat diversity, edge effect and edge habitat. Yellow warbler represents cottonwood-willow and other woody habitat associated with irrigation ditches and tail water. Mallard breeding habitat represents shallow wetlands and nesting habitat surrounding these wetlands. Mallard –winter habitat represents winter roosting areas (large water bodies and ice free water) and management of crop residues. Meadow vole represents sedge-rush wet meadows often associated with leaky ditches and inefficient irrigation. Marsh wren represents cattail- bulrush (robust emergents) wetlands and the screech owl is associated with groups of large deciduous trees. The models are custom models that underwent peer review and were developed explicitly for this project with the assistance of USFWS. Changes in wetland values are supposed to be tracked using the Avian Richness Evaluation Method (AREM) developed by Paul Adamus under contract with the Environmental Protection Agency (EPA). Refer to the 1994 Monitoring and Evaluation Plan (attached) for the Lower Gunnison Unit for details on monitoring methods used under the Colorado River Salinity Control Program.

METHODS

HEP is very labor intensive. Through 1995 habitat was evaluated and a HEP analysis was completed on more than 70% of all contracted acres before and after application of salinity control practices. Reductions in staff made this method unfeasible. To make the workload more manageable a statistical analysis of HEP data collected through 1998 was conducted to determine adequate sample size needed to calculate mean habitat suitability indexes (HSI) with 95% confidence the calculated mean is within + or - .1 of the real mean. HSI's are indexes ranging from 0 to 1.0 of the habitat value for selected wildlife species. The indexes are calculated using measurements of various habitat variables that are identified in habitat models (See 1994 Lower Gunnison Unit Monitoring and Evaluation Plan for complete details of the HEP procedure used). In 1999 and 2000 additional data was collected, desired sample sizes were achieved, and mean HSI values were calculated. The mean HSI for species models for 6 wildlife species were calculated for 2 separate categories; operating units not applying wildlife practices and operating units applying wildlife. These indexes were then multiplied with the average acres of habitat found on the operating units for each wildlife species to

obtain Habitat Units Values (HUV's). To estimate project impacts, HUV's were calculated both before and after project application. Analysis of data in 2001 indicated additional inventories are needed for yellow warbler and marsh wren to obtain the desired confidence levels. These inventories will be done during the 2004 and 2005 field seasons.

A spread sheet was developed to track additional information that may be useful in evaluating the project in reference to wildlife habitat and mitigation goals. Data such as wetland values, number of contracts planning and/or applying wildlife practices, acres of land managed for wildlife, and dollars spent on wildlife were recorded. The data was then analyzed to determine effectiveness of wildlife habitat replacement efforts.

Applications for financial assistance were awarded funding through ranking processes. The processes varied from 1996-2003 but incentives for applying wildlife habitat were included in all of them. In 1996 Interim-EQIP wildlife practices were prioritized the same as they were under the Colorado River Salinity Program. Under this system, applicants planning to apply wildlife practices received 3 to 5 extra points out of a possible 46. In 1997 ranking systems began to include cost-benefit computations and wildlife practices were given 2 extra points/acre not to exceed 10 total points. Wildlife practices are relatively expensive and with the cost benefit computations and 10 point maximum many wildlife practices were not being funded. In an attempt to increase wildlife funding ranking points were increased in 1998, to 6 points/acre with a 30point maximum for wetland habitat and 4 points/acre with a 20 point maximum for upland habitat. In 1999 the Montrose field office again increased points awarded for wildlife habitat development to 30 points/acre with a maximum of 150 points for either upland or wetland habitat. Delta created a sub fund of $37,800 to be spent only on wildlife habitat development. Wildlife applications were ranked using the system developed for the Wildlife Habitat Incentives Program. If money was left in the wildlife sub-fund it was transferred to salt control funds. In 2000 Montrose used the same ranking they did in 1999. In 2000 sub-funds were no longer allowed so Delta changed their ranking to 10 points/acre for upland or wetland habitat with a maximum of 50 points. Ranking procedures remained unchanged in 2003

RESULTS

Since 1989 the data indicates $1,054,023 which represents 4.1% of the total obligated funds ($25,398,380) in the Lower Gunnison Unit have been contracted for installing wildlife practices (Table 1). To date approximately 35% of the wildlife funds or 1.3% of the total funds have been spent on wildlife. $679,791 of obligated wildlife money is still contracted for implementing wildlife practices. The duration of contracts is 5 – 10 years, and projects planned in year 2002 may not be applied until year 2012. In 2003 EQIP contracts duration were changed to a minimum of 1 year after the last practice is installed. Thirty six percent of contracts developed since 1989 have at least 1 wildlife practice planned for application and **11.2% have applied at least 1 wildlife practice** (Table 2)**.**

Table 1: Money obligated and spent on wildlife practices.

OFFICE	YEAR	TOTAL CONTRACT DOLLARS	PLANNED WILDLIFE CONTRACT DOLLARS	APPLIED WILDLIFE CONTRACT DOLLARS	PERCENT PLANNED TO SPEND ON WILDLIFE	PERCENT OF WILDLIFE DOLLARS SPENT TO-DATE:	PERCENT OF TOTAL DOLLARS SPENT ON WILDLIFE TO-DATE
CRSCP	1989-1995	$13,063,223	$642,602.00	$215,844.00	4.9%	33.6%	1.7%
MONTROSE	1996	$813,596.00	$45,536.00	$29,421.00	5.6%	64.6%	3.6%
	1997	$495,230.00	$9,825.00	$3,988.00	2.0%	40.6%	0.8%
	1998	$481,723.00	$5,051.00	$3,938.00	1.0%	78.0%	0.8%
	1999	$373,836.00	$18,400.00	$14,167.00	4.9%	77.0%	3.8%
	2000	$353,919.00	$36,795.00	$14,934.00	10.4%	40.6%	4.2%
	2001	$480,994.00	$49,211.00	$1,395.00	10.2%	2.8%	0.3%
	2002	$827,860.00	$66,188.00	$8,476.00	8.0%	12.8%	1.0%
	2003	$1,846,066.00	$38,711.00	0	2.1%	0.0%	0.0%
	Basin Fund	$587,008.00	$10,372.00	$3,797.00	1.8%	36.6%	.6%
	SUBTOTAL	$6,260,232.00	$280,089.00	$80,116.00	4.5%	28.6%	1.3%
DELTA	1996	$782,910.00	$8,614.00	$5,733.00	1.1%	66.6%	0.7%
	1997	$165,966.00	$0.00	$0.00	0.0%	N.A.	0.0%
	1998	$157,269.00	$2,997.00	$456.00	1.9%	15.3%	0.3%
	1999	$632,279.00	$75,509.00	$61,129.00	11.9%	81.0%	9.7%
	2000	$427,731.00	$1,254.00	$672.00	0.3%	53.6%	0.2%
	2001	$430,535.00	$0.00	$0.00	0.0%	0.0%	0.0%
	2002	$941,505.00	$25.00	$0.00	0%	0.0%	0.0%
	2003	$1,907,003.00	$28,976.00	0	1.5%	0.0%	0.0%
	Basin fund	$629,727.00	$13,957.00	$10,282.00	2.2%	73.2%	1.6%
	SUBTOTAL	$6,074,925.00	$131,332.00	$78,272.00	2.2%	59.7%	1.3%
BOTH 1996-2003	TOTAL	$12,335,157.00	$411,421.00	$158,388.00	3.3%	38.5%	1.3%

Table 2. Number and percent of contracts planning and/or applying wildlife practices.

OFFICE	YEAR	TOTAL # OF CONTRACTS	# OF CONTRACTS WITH PLANNED WILDLIFE PRACTICES	PERCENT CONTRACTS WITH PLANNED WILDLIFE PRACTICES	# OF CONTRACTS WITH APPLIED WILDLIFE PRACTICES	PERCENT OF WILDLIFE CONTRACTS WITH APPLIED WILDLIFE PRACTICES	PERCENT OF ALL CONTRACTS THAT HAVE APPLIED WILDLIFE PRACTICES
CRSCP	1989-1995	343	174	50.7%	29	16.6%	8.5%
MONTROSE	1996	36	31	86.1%	21	67.7%	58.3%
	1997	63	13	20.6%	9	69.2%	14.3%
	1998	40	7	17.5%	4	57.1%	10.0%
	1999	23	6	26.1%	4	66.7%	17.4%
	2000	28	17	60.7%	7	41.2%	25.0%
	2001	28	20	60.7%	1	5.0%	3.6%
	2002	50	12	24.0%	2	16.7%	4.0%
	2003	18	7	38.9%	0	0.0%	0.0%
	Basin Fund	37	5	13.5%	3	60.0%	8.1%
	SUBTOTAL	332	118	36.5%	51	43.2%	15.8%
DELTA	1996	26	5	19.2%	5	100.0%	19.2%
	1997	23	2	8.7%	2	100.0%	8.7%
	1998	7	1	14.3%	1	100.0%	14.3%
	1999	40	11	27.5%	9	82.0%	22.5%
	2000	20	1	5.0%	1	100.0%	5.0%
	2001	18	0	0.0%	0	0.0%	0.0%
	2002	32	1	2.9%	0	0.0%	0.0%
	2003	20	4	20.0%	0	0.0%	0.0%
	Basin Fund	22	1	4.6%	1	100.0%	4.6%
	SUBTOTAL	208	26	12.0%	19	85.7%	10.2%
BOTH – 1996-2003	TOTAL	540	144	26.6%	70	48.6%	13.0%

Table 3 outlines the acres of habitat management planned and applied. Approximately 558 acres of wetland habitat and 1162 acres of upland habitat have planned management practices. Habitat management practices have been applied to 206 acres of wetland and 422.3 acres of upland habitat. To date 37% of planned wetland management and 36% of upland management practices have been applied. There were no reported wetland impacts positive or negative.

Table 3. Acres of wildlife habitat management planned and applied and wetland impacts.

OFFICE	YEAR	ACRES OF WETLAND HABITAT PLANNED	ACRES OF WETLAND HABITAT APPLIED	% OF PLANNED WETLAND ACRES APPLIED	ACRES OF UPLAND HABITAT PLANNED	ACRES OF UPLAND HABITAT APPLIED	% OF PLANNED UPLAND ACRES APPLIED	ACRES OF WETLANDS IMPACTED	WETLAND VALUE BEFORE	WETLAND VALUE AFTER
CRSCP		398.8	112.8	28.3%	707.5	197.3	27.9%	No Data	No Data	No Data
MONTROSE	1996	17.5	11.4	65.1%	29.2	17.6	60.3%			
	1997	14.1	13.6	96.5%	31.5	26.8	85.1%			
	1998	3.5	1.5	42.9%	4.4	3.3	75.0%			
	1999	16.1	7.5	46.6%	6.0	3.0	50.0%			
	2000	11.8	6.0	50.8%	32.6	2.3	7.1%			
	2001	7.2	0.0	0.0%	75.4	5.0	6.6%			
	2002	7.5	2.0	26.7%	18.0	8.5	47.2%			
	2003	23.7	0	0.0%	23	0	0.0%			
	BASIN	1.5	6	400.00 %	1	2	200.0%			
	SUB TOTAL	102.9	48	46.6%	221.1	68.5	31.0%	No Data	No Data	No Data
DELTA	1996	21.0	21.0	100.0%	61.2	61.2	100.0%	4	1.4	3.0
	1997	15.7	10.0	64.7%	66.7	45.9	68.8%	2	1.8	1.9
	1998	5.4	4.4	81.5%	15.8	14.2	89.9%	1	.6	1.6
	1999	8.5	5.0	58.8%	26.0	19.2	73.9%	1	1.1	1.2
	2000	0.0	0.0	0.0%	11.2	6.0	53.6%			
	2001	0.0	0.0	0.0%	0.0	0.0	0.0%			
	2002	.5	0.0	0.0%	6.5	0.0	0.0%			
	2003	1	0	0	35.7	0	0			
	BASIN	5.0	5.0	100.0%	10.0	10.0	100.0%			
	SUB TOTAL	57.1	45.4	79.5%	233.1	156.5	67.1%	No Data	No Data	No Data
BOTH	TOTAL – 1996-2003	160	93.2	58.3%	454.2	225.0	49.5%	No Data	No Data	No Data

Calculated Habitat Unit Values (HUV's) for both the Montrose and Delta field office's years 1996-2003 are displayed in table 4. To date with 22% of the planned wildlife practices actually applied, total HUV's after application are 1356 less than before application.. (23% of the positive change in 2003 is the result of crediting in 1 year- 2003, all of the WHIP and WRP contracts applied since 1996)

Table 4: Habitat impacts estimated with mean Habitat Unit Values.

Species	CRSCP 1989-1995 HUV's	CRSCP & EQIP 1996-2002 HUV's	CRSCP & EQIP 1996-2003 HUV's	Net-change in HUV's from yr. 2002 to yr. 2003
Pheasant	+210	-1196	-945	+251
Yellow warbler	+1	-105	-108	-3
Mallard - breeding habitat	+79	--229	-158	+71
Mallard – winter habitat	+128	+631	+767	+136
Meadow vole	+43	-320	-287	+33
Marsh Wren	+16	-97	-100	-3
Screech owl	+123	-1028	-757	+271
Total	+600	-2344	-1356	+988

Discussion & Conclusion:

It is difficult to assess EQIP's effectiveness in replacing wildlife habitat values as most contracts have not been completed and wildlife practices are often the last practices in a contract to be applied. Data analysis in the yr. 2000 report indicated that habitat losses would adequately be mitigated if 25% of all contracts applied a wildlife practice and recent data supports that goal. The current rate of contracts applying wildlife practices is 11.2%. If 100% of the currently planned practices are applied, total HUV's after application would be an estimated 1000 units more than before application. An 80% rate of application of planned practices would result in the same number of HUV's before and after application. The 2003 planning rate of 29% could achieve mitigation even at 90-100% application rate. If the planning rate is increased further, a proportional decrease in application rate could still achieve habitat replacement objectives. Past application rates of 30% (Lower Gunnison Unit CRSCP) and 33% (Grand Valley Unit – through 1997) indicate an 80-90% application rate may be hard to achieve. The Lower Gunnison Unit tracks impacts by habitat values rather than acres. Acres of habitat management and impacts to wetlands have also been tracked as other indicators of impacts. Wetland impacts accounting indicate there is no data. This tracking responsibility has been overlooked and needs to be addressed by the wildlife biologist at Montrose and the wildlife biologist position that has been added to the Delta staffing plan. The ranking systems utilized in 2003 encouraged application of wildlife practices, but the lack of planning emphasis on wildlife practices have limited producer participation.

In addition to the wildlife practices planned and applied with EQIP priority funds, several wildlife benefiting projects were funded with Wildlife Habitat Incentives Program (WHIP) and Wetland Reserve Program (WRP) funds in the priority area. Since 1996, twelve WHIP contracts and 1 WRP contract totaling $80,700.00 have been completed benefiting 184.9 acres of upland wildlife habitat and 32.6 acres of wetland wildlife habitat in the priority area since 1996. In 2003, the benefits derived from WHIP and WRP contracts that have been applied within the Lower Gunnison salinity area boundaries were included in the habitat replacement values in this report. While these contracts may have higher HUV"S values than the average contract, they were entered into the spreadsheet as plans with wildlife and plans applying wildlife.

In summary, achievement of habitat replacement goals is achievable under current policies if some adjustments are made. NRCS should have a minimum goal that 25% of all contracts will ***apply*** wildlife practices. The volunteer replacement program is inefficient but does provide landowners with opportunity to develop habitat on their land. In addition to the volunteer program, acquisition of large blocks of valuable wildlife habitat along riparian corridors etc. such as what the Bureau of Reclamation has done should be pursued. While the USDA EQIP statue prohibits funding for long term easement and land acquisition, partnering with other entities and agencies that have these authorities with basin states funding should be pursued. It could be a less expensive and more efficient method to achieve replacement of habitat values forgone. It would also be more valuable long term wildlife habitat as urbanization continues to fragment agricultural lands.

APPENDICES

Site 1. Mesa clay loam, alfalfa. Eighteen acres. Siphon tubes from concrete ditch.

	----------Acre-feet/acre----------				hours
Irrigation Dates	Soil Moisture Deficit	Irrigation Amount	Infiltration	Deep Percolation	Time
5/06*	0.62	0.68	0.60	<0.02>	60
5/24	0.25	0.58	0.36	0.10	60
6/09	0.35	0.58	0.38	0.03	60
6/24	0.39	0.58	0.39	0.00	60
7/09	0.42	0.58	0.32	<0.10>	60
7/20	0.28	0.58	0.34	0.06	60
8/14	0.36	0.58	0.38	0.02	48
9/03	0.32	0.58	0.37	0.05	48

*Runoff flume washed around, estimated runoff

<> denotes deficit irrigation

Site 2b. Mesa clay loam 8 acres. Poplar trees. Buried pipe to gated pipe.

	----------Acre-feet/acre----------				Hours
Irrigation Dates	Soil Moisture Deficit	Irrigation Amount	Infiltration	Deep Percolation	Time
6/5	0.95	1.15	0.81	<0.14>	48
7/8	1.19	1.19	0.91	<0.19>	48

<> denotes deficit irrigation

Site 3. Mesa clay loam 16.8 acres. Sweet corn. Siphon tubes from concrete ditch.

	----------Acre-feet/acre----------				Hours
Irrigation Dates	Soil Moisture Deficit	Irrigation Amount	Infiltration	Deep Percolation	Time
5/06	0.50	1.08	0.64	0.14	60
5/20	0.20	1.18	0.66	0.46	60
6/10	0.27	0.89	0.40	0.13	48
6/19	0.29	0.94	0.44	0.15	48
7/01	0.30	0.98	0.49	0.19	48
7/11	0.34	1.02	0.46	0.12	48
7/24	0.27	0.94	0.39	0.12	46
8/04	0.25	1.01	0.39	0.14	48

Site 4. Mesa clay loam. Variable acreage. Feed corn. Buried pipe to gated pipe.

Irrigation times varied from 24 hours on the PAM (hydrogel) treated side to 30 hours to the conventionally treated side.

No deep percolation losses were determined since no inflow amounts were determined.

The conventionally treated side had 5 irrigations, and the hydrogel treated side had 4 irrigations.

A complete report of results other than irrigation is available upon request.